

Cambridge IGCSE
MATHEMATICS

0580 - P4

2020 - 2025

QUESTIONS + ANSWERS

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1 - (0580/41_Summer_2020_Q1) - Simple And Compound Interest , Percentages, Ratio And Proportion

(a) In 2018, Gretal earned \$32 000.

(i) She paid tax of 24% on these earnings.

Work out the amount she paid in tax in 2018.

\$ [2]

(ii) In 2019, Gretal’s earnings increased by 7%.

Work out her earnings in 2019.

\$ [2]

(b) Gretal invests \$5000 at a rate of 2% per year compound interest.

Calculate the value of her investment at the end of 3 years.

\$ [2]

(c) One month, Gretal spent a total of \$360 on presents.

She spent $\frac{1}{5}$ of this total on presents for her parents.

She spent $\frac{2}{3}$ of the remaining money on presents for her friends.

She spent the rest of the money on presents for her sisters.

Calculate the percentage of the \$360 that she spent on presents for her sisters.

..... % [4]

- (d) Arjun earned \$36 515 in 2019.
This was an increase of 9% on his earnings in 2018.

Work out his earnings in 2018.

\$ [2]

- (e) Arjun and Gretal each pay rent.

In 2018, the ratio of the amount each paid in rent was Arjun : Gretal = 5 : 7.

In 2019, the ratio of the amount each paid in rent was Arjun : Gretal = 9 : 13.

Arjun paid the same amount of rent in both 2018 and 2019.

Gretal paid \$290 more rent in 2019 than she did in 2018.

Work out the amount Arjun paid in rent in 2019.

\$ [4]

2 - (0580/42_Summer_2020_Q1) - Percentages, Ratio And Proportion, Simple And Compound Interest

(a) (i) Divide \$24 in the ratio 7 : 5.

\$, \$ [2]

(ii) Write \$24.60 as a fraction of \$2870.
Give your answer in its lowest terms.

..... [2]

(iii) Write \$1.92 as a percentage of \$1.60 .

..... % [1]

(b) In a sale the original prices are reduced by 15%.

(i) Calculate the sale price of a book that has an original price of \$12.

\$ [2]

(ii) Calculate the original price of a jacket that has a sale price of \$38.25 .

\$ [2]

- (c) (i) Dean invests \$500 for 10 years at a rate of 1.7% per year simple interest.

Calculate the total interest earned during the 10 years.

\$ [2]

- (ii) Ollie invests \$200 at a rate of 0.0035% **per day** compound interest.

Calculate the value of Ollie's investment at the end of 1 year.

[1 year = 365 days.]

\$ [2]

- (iii) Edna invests \$500 at a rate of $r\%$ per year compound interest.
At the end of 6 years, the value of Edna's investment is \$559.78 .

Find the value of r .

$r =$ [3]

3 - (0580/43_Summer_2020_Q1) - Ratio And Proportion, Percentages

(a)

Campsite fees (per day)	
Tent	\$15.00
Caravan	\$25.00

The sign shows the fees charged at a campsite.
Today there are 54 tents and 18 caravans on the site.

Calculate the fees charged today.

\$ [2]

(b) In September the total income at the campsite was \$37 054.
This was a decrease of 4.5% on the total income in August.

Calculate the total income in August.

\$ [2]

(c) The visitors to the campsite today are in the ratio

men : women = 5 : 4 and women : children = 3 : 7.

(i) Calculate the ratio men : women : children in its simplest form.

..... : : [2]

(ii) Today there are 224 children at the campsite.

Calculate the total number of men and women.

..... [3]

- (d) The space allowed for each tent is a rectangle measuring 8 m by 6 m, each correct to the nearest metre.

Calculate the upper bound for the area of the space allowed for each tent.

..... m² [2]

- (e) The value of the campsite has increased exponentially by 1.5% every year since it opened 30 years ago.

Calculate the value of the campsite now as a percentage of its value 30 years ago.

..... % [2]

4 - (0580/41_Winter_2020_Q2) - Ratio And Proportion, Speed,distance And Time

- (a) A plane has 14 First Class seats, 70 Premium seats and 168 Economy seats.

Find the ratio First Class seats : Premium seats : Economy seats.
Give your answer in its simplest form.

..... : : [2]

- (b) (i) For a morning flight, the costs of tickets are in the ratio

$$\text{First Class : Premium : Economy} = 14 : 6 : 5.$$

The cost of a Premium ticket is \$114.

Calculate the cost of a First Class ticket and the cost of an Economy ticket.

First Class \$

Economy \$ [3]

- (ii) For an afternoon flight, the cost of a Premium ticket is reduced from \$114 to \$96.90 .

Calculate the percentage reduction in the cost of a ticket.

..... % [2]

- (c) When the local time in Athens is 0900, the local time in Berlin is 0800.

A plane leaves Athens at 13 15.

It arrives in Berlin at 15 05 local time.

- (i) Find the flight time from Athens to Berlin.

..... h min [1]

- (ii) The distance the plane flies from Athens to Berlin is 1802 km.

Calculate the average speed of the plane.

Give your answer in kilometres per hour.

..... km/h [2]

ANSWERS

1 - (0580/41_Summer_2020_Q1) - Simple And Compound Interest , Percentages, Ratio And Proportion

(a)(i)	7680	2	M1 for $0.24 \times 32\,000$ oe
(a)(ii)	34 240	2	M1 for $32\,000 \times \frac{100+7}{100}$ oe
(b)	5306.04	2	M1 for $5000 \times \left(1 + \frac{2}{100}\right)^3$ oe
(c)	26.7 or 26.66... to 26.67	4	B3 for 96 or $\frac{96}{360}$ oe OR M3 for $\left(1 - \frac{1}{5}\right) \times \left(1 - \frac{2}{3}\right) \times 100$ oe or M2 for $\left(1 - \frac{1}{5}\right)$ and $\left(1 - \frac{2}{3}\right)$ oe OR M1 for $360 \div 5 [\times 4]$ oe M1 for <i>their</i> $288 \div 3 [\times 2]$
(d)	33 500	2	M1 for $36\,515 \div \frac{100+9}{100}$ oe
(e)	6525	4	M3 for $\left(\frac{65}{45} - \frac{63}{45}\right)[A] = 290$ oe or M2 for $\left(\frac{13}{9} - \frac{7}{5}\right)[A] = 290$ oe or M1 for correct attempt to convert to a common ratio value for Arjun or for $\frac{13}{9} - \frac{7}{5}$ oe

2 - (0580/42_Summer_2020_Q1) - Percentages, Ratio And Proportion, Simple And Compound Interest

(a)(i)	14, 10	2	M1 for $24 \div (7 + 5)$
(a)(ii)	$\frac{3}{350}$	2	B1 for correct fraction not in lowest terms
(a)(iii)	120	1	
(b)(i)	10.2[0]	2	M1 for $\frac{15}{100} \times 12$ oe or better
(b)(ii)	45	2	M1 for $\frac{38.25}{1 - \frac{15}{100}}$ oe
(c)(i)	85	2	M1 for $\frac{500 \times 1.7 \times 10}{100}$ oe
(c)(ii)	203 or 202.5 to 202.6	2	M1 for $200 \times \left(1 + \frac{0.0035}{100}\right)^{365}$
(c)(iii)	1.9	3	M2 for $\sqrt[6]{\frac{559.78}{500}}$ or M1 for $500 \left(1 + \frac{r}{100}\right)^6 = 559.78$

3 - (0580/43_Summer_2020_Q1) - Ratio And Proportion, Percentages

(a)	1260	2	M1 for $15 \times 54 + 25 \times 18$
(b)	38 800	2	M1 for $37054 \div \left(1 - \frac{4.5}{100}\right)$ oe
(c)(i)	15 : 12 : 28	2	M1 for correct attempt to find a common multiple for the women oe
(c)(ii)	216	3	M2 for $224 \div \text{their } 28 \times \text{their } (15 + 12)$ or M1 for $224 \div \text{their } 28$
(d)	55.25	2	M1 for $8 + 0.5$ or $6 + 0.5$ seen
(e)	156 or 156.3...	2	M1 for $\left(1 + \frac{1.5}{100}\right)^{30}$

4 - (0580/41_Winter_2020_Q2) - Ratio And Proportion, Speed,distance And Time

(a)	1 : 5 : 12	2	M1 for 2 : 10 : 24 or 7 : 35 : 84 or $\frac{1}{18} : \frac{5}{18} : \frac{12}{18}$
(b)(i)	266 and 95	3	B2 for 266 or 95 or 266 and 95 reversed or M1 for $\frac{114}{6}$
(b)(ii)	15	2	M1 for $\frac{114 - 96.9}{114} [\times 100]$ oe or $\frac{96.9}{114} \times 100$
(c)(i)	2h 50min	1	
(c)(ii)	636	2	M1 for $1802 \div \text{their } 2\text{h } 50\text{min}$

5 - (0580/42_Winter_2020_Q1) - Speed,distance And Time

(a)	9080 cao	3	B2 for 9078 to 9081... or M1 for $813 \times \text{their } 11\text{h } 10\text{min}$
(b)(i)	654 or 653.5...	2	M1 for $10260 \div 15\text{ h } 42\text{ min}$ oe
(b)(ii)(a)	21.8 or 21.82 to 21.83	1	
(b)(ii)(b)	4.58 or 4.59 cao	2	M1 for $470 \div (10260 \div 100)$ oe or $100 \div \text{their } \mathbf{(b)(ii)(a)}$
(c)	12.97	1	

19 - (0580/43_Winter_2023_Q11) - Quadratic Equations, Differentiation

(a)	$(-2, 0)$ $(0, 18)$ $(4.5, 0)$ oe	4	B1 for $B = (0, 18)$ B3 for $A = (-2, 0)$ and $C = (4.5, 0)$ oe or B2 for $x = -2$ and $x = 4.5$ oe or B1 for $(9 - 2x)(2 + x)$ oe or either A or C correct
(b)	$5 - 4x$ final answer	2	B1 for one correct term when simplified
(c)	$(-3, -15)$	3	B2FT for $x = -3$ OR M1 for <i>their</i> $(b) = 17$ M1 dep for correct substitution of <i>their</i> x into $18 + 5x - 2x^2$ shown

20 - (0580/41_Summer_2024_Q8) - Differentiation, Graphical Solution Of Equations

(a)	Correct sketch with roots indicated at $x = -9$ and $x = 2$ and y intercept = -18 Minimum should be in 3rd quadrant	4	B1 for U shaped parabola B2 for roots at -9 and 2 on diagram or M1 for $(x + 9)(x - 2) [= 0]$ B1 for y - intercept at -18 on diagram Maximum 3 marks if sketch not fully correct
(b)(i)	$2x - 3$	2	B1 for $2x + k$ or $kx^{[p]} - 3$
(b)(ii)	$(1.5, -30.25)$ oe	3	B2 for $x = 1.5$ or M1 for <i>their</i> $(b)(i) = 0$ or for $(x - 1.5)^2$
(c)	$x^2 - x - 33 [= 0]$ seen	B1	
	$\frac{[-]1 \pm \sqrt{([-]1)^2 - 4(1)(-33)}}{2 \times 1}$ oe	B2FT	FT <i>their</i> quadratic dep on no factors B1 for $\sqrt{([-]1)^2 - 4(1)(-33)}$ or better or B1 for $\frac{[-]1 + \sqrt{q}}{2(1)}$ oe or $\frac{[-]1 - \sqrt{q}}{2(1)}$ oe
	-5.27 or -5.267 to -5.266 and 6.27 or 6.266 to 6.267	B2	B1 for each If 0 scored, SC1 for -6.27 and 5.27
$(-5.27, 15.53$ or $15.54)$ and $(6.27, -7.53$ or $-7.54)$	B1		

21 - (0580/42_Summer_2024_Q11) - Differentiation

(a)	$-4(-1)^3 - 9(-1)^2 + 5$ or better	M1	
	$= 0$ [so stationary point]	A1	with no errors
(b)(i)	18	3	B2 for $6x^2 - 6$ isw OR B1 for $6x^2 + k$ (any k) isw or $px^2 - 6$ isw ($p \neq 0$) or $6x^2 - 6 + 8$ M1 dep on B1 for $x = -2$ substituted into <i>their</i> $\frac{dy}{dx}$
(b)(ii)	1 and -1	2	M1 for $6x^2 - 6 = 0$ oe seen or for <i>their</i> $\frac{dy}{dx} = 0$ if B1 scored in part (b)(i)

22 - (0580/43_Summer_2024_Q10) - Differentiation

(a)	$7x^6 - 42x^5$ final answer	2	B1 for one correct term $7x^6$ or $42x^5$ or for $7x^6 - 42x^5$ seen and spoiled
(b)	$49x + 41$	4	M1 for substituting $x = -1$ into $[y =] x^7 - 7x^6$ M1 for $x = -1$ substituted in <i>their</i> (a) or the correct derivative to give <i>their</i> m M1 for <i>their</i> $-8 = (\text{their } m)(-1) + c$ oe
(c)	(0, 0) (6, -46 656)	5	B4 for (6, -46 656) or B3 for $x = 0$ and 6 OR M1 for <i>their</i> $\frac{dy}{dx} = 0$ or stating $\frac{dy}{dx} = 0$ and M1 for a correct method to solve <i>their</i> $7x^6 - 42x^5$

23 - (0580/42_Winter_2024_Q10) - Differentiation

(a)	$3x^2 - 18x - 48$ final answer	2	B1 for two correct terms or for correct answer seen then spoiled
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(b)	<i>their</i> $\frac{dy}{dx} = 0$ soi	M1	
	$[3](x - 8)(x + 2)$ oe or $\frac{-(-18) \pm \sqrt{(-18)^2 - 4(3)(-48)}}{2 \times 3}$ oe or $3 \pm \sqrt{16 + 3^2}$	M1	oe $\frac{18 \pm \sqrt{900}}{6}$
	(-2, 52) (8, -448)	B2	B1 for one correct pair of coordinates or for two correct values of x
(c)	(-2, 52) maximum with reason and (8, -448) minimum with reason and no incorrect statement	3	Reasons could be e.g. 1. A reasonable sketch of a positive cubic 2. Correct evaluation and use of 2nd derivative $6x - 18 = -30$, $-30 < 0$, so (-2, 52) is a maximum oe. $6x - 18 = 30$, $30 > 0$, so (8, -448) is a minimum oe. 3. Evaluates correctly values of y on both sides of both correct stationary points 4. Finds gradient on each side of both correct stationary points. Any incorrect statement MAX B2 B2 for 1 correct with correct reason for that stationary point or for both x -values correct and reasonable sketch of a positive cubic or for correct substitution and evaluation of both of <i>their</i> x -values into <i>their</i> second derivative or substitution and evaluation for one x -value on both sides of both of <i>their</i> stationary points to find the gradients soi or M1 for showing [2nd derivative =] $6x - 18$ or correct FT <i>their</i> 2nd derivative from part (a) or substitution and evaluation shown for one x -value on both sides of one of <i>their</i> stationary points to find the gradients soi or for sketch of any positive cubic.

24 - (0580/43_Winter_2024_Q10) - Differentiation

(a)	$2 - 2x$	2	B1 for $k - 2x$ or $2 - kx$ or $3 + 2 - 2x$
(b)(i)	Gradient (m) = correct substitution of -1 into <i>their</i> (a) $2 - 2(-1)$	M1	
	$0 = \textit{their } m \times -1 + c$ or $y [-0] = \textit{their } m(x - -1)$ oe	M1	Dep on previous M1
	$c = 4$ and leading to $y = 4x + 4$	A1	
(b)(ii)	$-\frac{1}{4}x + \frac{7}{2}$ oe	3	M1 for $-\frac{1}{4}$ M1 for $3 = \textit{their } m \times 2 + c$ or better or $y - 3 = \textit{their } m(x - 2)$ or better
(c)	(1, 4)	3	B2 for $x = 1$ or M1 for <i>their</i> (a) = 0 M1 for substituting <i>their</i> 1 into $y = 3 + 2x - x^2$ OR B2 for $x = 1$ or M2 for $4 - (x - 1)^2$ or M1 for $(x - 1)^2$

25 - (0580/42_Summer_2025_Q26) - Differentiation

	$[a =] 4$ $[b =] 6$ $[c =] 5$	2	B1 for one correct
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26 - (0580/43_Winter_2025_Q20) - Differentiation

(a)	$3x^2 + 6x - 13$ final answer	2	B1 for two terms correct or correct answer seen then spoilt
(b)	32	2	FT <i>their</i> $\frac{dy}{dx}$ dep on B1 earned in (a) M1 for correct substitution of $x = 3$ into <i>their</i> $\frac{dy}{dx}$